

Level Up Your Redundant Network by Ethernet Ring Protection Switching (ERPS)

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Executive Summary

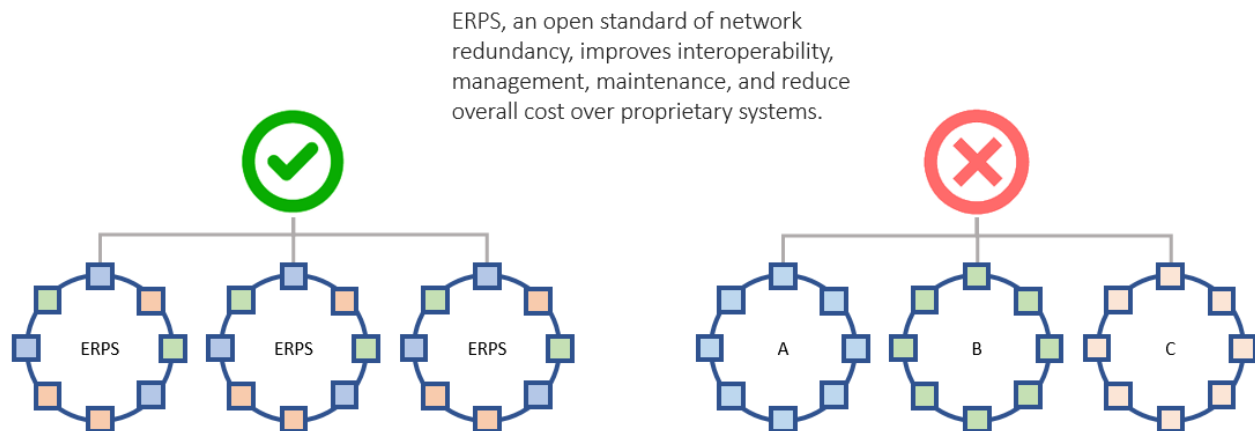
Redundant technology plays a critical role in industrial networking. Over the past decade, various proprietary technologies have been seen on the market due to the off-the-shelf standards couldn't satisfy industrial requirements. As industrial Ethernet gradually dominates the market, it requires a new standard that boosts the capability whilst overcoming the inconvenience of using proprietary ones. This document addresses the improvements of the standard, ERPS, and a selection guide among Korenix's redundant solutions.

ERPS: Openness Rather Than Proprietary

ITU-T G.8032 Ethernet Ring Protection Switching (ERPS) is an open standard defined by the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T). It utilizes ring topology to achieve network redundancy and meets the goals of faster recovery and deterministic. Its major characteristics and benefits include:

1. **Openness**, releases users from being tied to proprietary technologies and makes the integration among multiple networks easy.

2. **Sub-50ms recovery**, fast enough for most industrial applications, such as public utility, traffic and transportation, waste and water, oil and gas, mining, automation, surveillance and so on.
3. **Using mature Ethernet technologies**, thus can run on existing networks without special hardware parts.



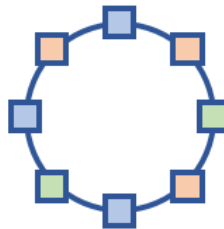
ERPS Version 2: Beyond A Ring

While ERPS version 1 aims at openness, it is the version 2 that makes big difference against the existing industrial redundant technologies. There two important enhancements:

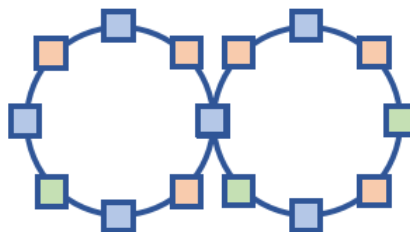
1. Incomparable Flexibility in Topology

The capability of coupling multiple rings into one single network makes ERPS version 2 outstanding from all the other redundant ring technologies. Rings can be coupled in different ways for unlimited levels, while each ring works independently without compromise on the failure recovery time. This greatly enhances the scalability and flexibility in deploying and extending a network. The topology can be, for example:

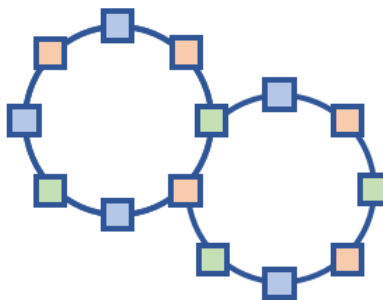
- Single ring



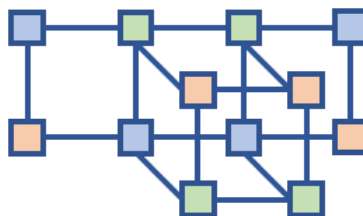
- Two rings with a shared node



- Two rings with shared nodes and links



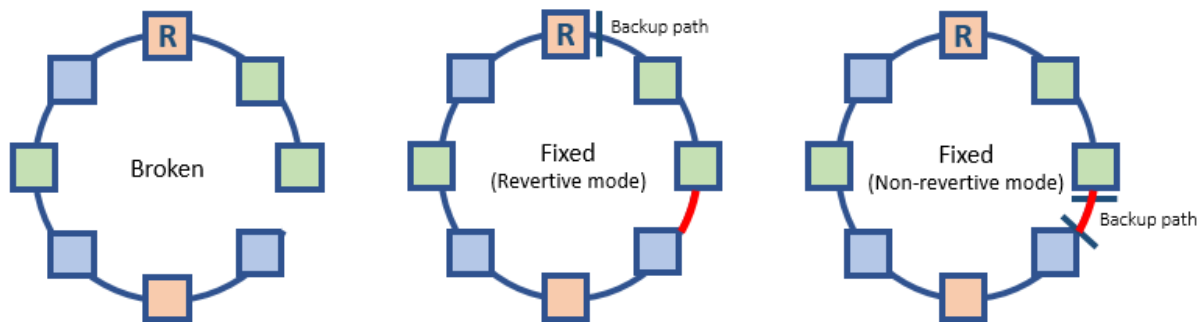
- Ladder topology



2. No Packet Loss Upon Fixing A Broken Ring

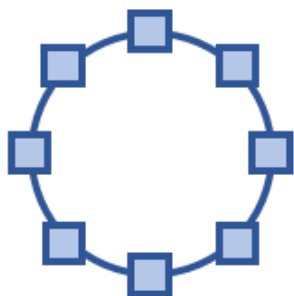
Out of most users' knowledge, not only link failure results in packet loss, restoration might cause packet loss as well. There are two important time intervals in redundant ring operation. One is the so-called Recovery, the interval that a ring takes to recover a failure. And the other is Restoration, the interval required to revert a broken ring into a healthy ring.

ERPS version 2 eliminates the Restoration by introducing a mechanism named 'Non-revertive mode', which makes use of the restored link as the backup path, instead of reverting the backup path to the ring master. No packet will be lost because there is no handover process. The non-revertive mode greatly enhances the stability of the network especially for mission critical industrial applications.



Selection Guide

Korenix offers both proprietary and open technologies to meet various requirements. There are some key aspects in designing redundant networks. Mostly often, they are recovery time, topology, maximum size, total bandwidth, ability of interconnection. The below feature highlight helps users to select among these options. Please refer to the appendix comparison table for more detail.

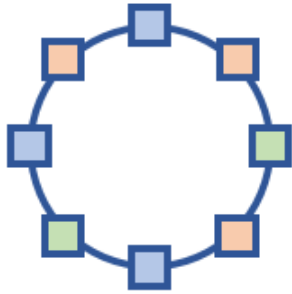


Korenix MSR

Ultra-Fast Recovery Without Critical Point

One of the best redundant technology, 5ms fast recovery, 0ms seamless restoration.

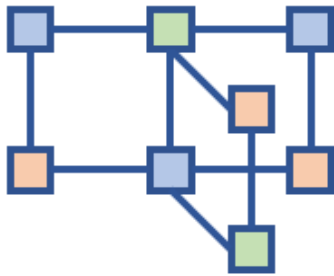
Patented ring master redundancy mechanism eliminates the risk of single point of failure on the switch node which manages the ring.



ERPS V1

Single Ring and Openness

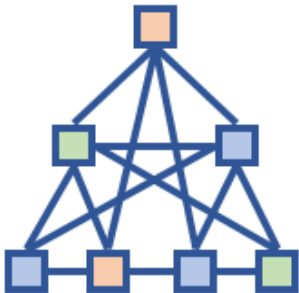
Interoperable among brands, while lower the over cost of purchasing, managing, and maintenance. Good enough failover time, 50ms recovery and 50ms restoration, for most industrial applications.



ERPS V2

Flexible Topology Without Compromise on Recovery Time

Future proof, easy extension. Each ring operates independently, and the recovery time in each ring is still deterministic, 50ms recovery, 50ms (or 0ms) restoration.



RSTP

Any Topology, Multiple Redundancy, No Critical Demand on Recovery Time

Market approved protocol for connecting Ethernet switches into any kind of topology. While there can be multiple redundant paths, the recovery time depends on the network size and topology, up to a few seconds. More suitable for non-critical applications.

Summary

ERPS (Ethernet Ring Protection Switching) is an open standard designed to meet the network redundant requirements of most industrial applications. It enhances the interoperability, scalability, and overall costs, whereas eliminates the issues of using proprietary systems. Korenix supports ERPS, both version 1 and version 2, which level up its Ethernet switch solutions for industrial customers.

Appendix

Comparison among the redundant technologies provided by Korenix.

	Korenix MSR	ERPS V1	ERPS V2	RSTP
Protocol	Proprietary	ITU-T G.8032	ITU-T G.8032	IEEE 802.1w
Topology	Ring	Ring	Ladder Ring	Any
Failover time	5ms	50ms	50ms	Non deterministic
Restoration time	0ms	50ms	50ms or 0ms	Non deterministic
Failure impact	In the ring	In the ring	In the ring	The whole network
RM redundancy	Yes	No	No	Yes
Ring size	No limit	No limit	No limit	23 levels
Extension	MultiRing, TrunkRing, SuperChain, DualHoming	n/a	Multiple Ring, Ladder Ring	Any

Korenix Technology, a Beijer group company within the Industrial Data Communication business area, is a global leading manufacturer providing innovative, market-oriented, value-focused Industrial Wired and Wireless Networking Solutions

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